

## CLAIMS

What is claimed is:

1. A multi-array system, comprising:
  - a first solid substrate having a first surface;
  - a second solid substrate having a second surface, wherein the first and second solid substrates are positioned so that the first surface faces the second surface;
  - a spacer contacting and separating the first and second solid substrates, so as to form at least one reaction chamber comprising a fluid-receiving space between the first and second surfaces,
  - a first biomolecule array immobilized on the first surface; and
  - a second biomolecule array immobilized on the second surface, wherein the first and second biomolecule arrays are exposed to the fluid-receiving space.
2. The multi-array system of claim 1, wherein the reaction chamber is substantially enclosed by the first and second surfaces and the spacer.
3. The multi-array system of claim 1, wherein the reaction chamber comprises one or more openings.
4. The multi-array system of claim 3, wherein the one or more openings are sealable.
5. The multi-array system of claim 1, wherein each of the first and second surfaces is substantially planar.
6. The multi-array system of claim 1, wherein each of the first and second solid substrates comprises a material selected from the group consisting of glass, plastic, and silicon.
7. The multi-array system of claim 6, wherein each of the first and second solid substrates is a coated glass slide or a nylon-overlaid glass slide.

8. The multi-array system of claim 1, wherein the first and second surfaces are in substantially parallel planes.
9. The multi-array system of claim 1, wherein both the first and second biomolecule arrays are polynucleotide arrays.
10. The multi-array system of claim 1, wherein both the first and second biomolecule arrays are protein arrays.
11. The multi-array system of claim 10, wherein both the first and second biomolecule arrays are antibody arrays.
12. The multi-array system of claim 1, wherein the first biomolecule array comprises a different set of biomolecules than the second biomolecule array.
13. The multi-array system of claim 1, wherein the first biomolecule array and the second biomolecule array are substantially identical.
14. The multi-array system of claim 1, wherein the spacer is removably adhered to the first and second surfaces.
15. The multi-array system of claim 1, wherein the spacer forms a watertight seal with the first and second surfaces.
16. The multi-array system of claim 1, wherein the spacer is made of plastic, rubber, or Teflon®.
17. The multi-array system of claim 16, wherein the spacer is made of rubber.
18. The multi-array system of claim 17, wherein the spacer is made of silicone rubber.

19. The multi-array system of claim 17, wherein the spacer is a rubber gasket and the reaction chamber is enclosed by the first surface of the first solid substrate, the second surface of the second solid substrate, and the spacer.
20. The multi-array system of claim 19, wherein the spacer is between about 0.1 mm and about 3 mm thick.
21. The multi-array system of claim 1, wherein the average distance in the reaction chamber between the first surface of the first solid substrate and the second surface of the second solid substrate is between about 0.01 mm and about 2 cm.
22. The multi-array system of claim 21, wherein the average distance is between about 0.01 mm and about 5 mm.
23. The multi-array system of claim 22, wherein the average distance is between about 0.1 mm and about 3 mm.
24. The multi-array system of claim 1, wherein the volume of the reaction chamber is between about 5  $\mu$ l and about 10 ml.
25. The multi-array system of claim 24, wherein the volume is between about 50  $\mu$ l and about 1 ml.
26. An apparatus, comprising:  
the multi-array system of claim 1; and  
a temperature control unit, wherein the temperature control unit functions to alter the temperature of the reaction chamber.
27. The apparatus of claim 26, wherein the temperature control unit is a thermal cycler, a water bath, or an air oven.

28. A method of performing an assay on a plurality of biomolecule arrays simultaneously, comprising using the multi-array system of claim 1 in at least one step of the assay.
29. A method of making a multi-array system, comprising the steps of:  
providing a first substrate having a first surface, wherein a first biomolecule array is immobilized on the first surface;  
providing a second solid substrate having a second surface, wherein a second biomolecule array is immobilized on the second surface; and  
fixably positioning the first and second solid substrates using a spacer so as to form a reaction chamber in which the first and second surfaces face each other and are separated by a fluid-receiving space, and in which the first and second biomolecule arrays are exposed to the fluid-receiving space.
30. A kit, comprising the multi-array system of claim 1.
31. The kit of claim 30, further comprising instructions regarding the use of the multi-array system in at least one step of an assay.